CASE STUDY

STRUCTURAL INSULATION

Eco-friendly SIP housing solution

At first glance the three-bedroom bungalow's appearance is unremarkable. But its structure is wholly unique: entirely made with ArmaPET™ cored structural insulating panels. **Armacell in action.**

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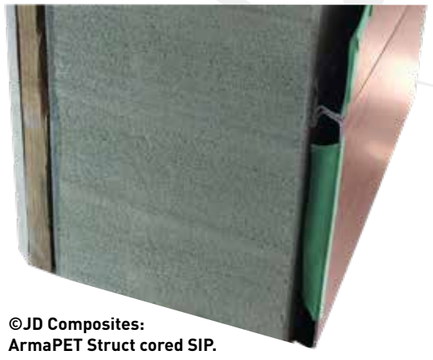
MAKING A DIFFERENCE AROUND THE WORLD

WELCOME TO 39 SUNSET LANE

Located on the Meteghan River waterfront on Nova Scotia's southwest shore, the 2,000-square-foot beachfront home looks like any other. It has a kitchen, three bedrooms, bathrooms and a roof, and from a distance it looks like it might be made of wood. Far from it, however, the conventional design hides a unique structure: it is the first structural insulated panels (SIP) home using ArmaPET Struct, based on 100% recycled PET. Or as the builders, Joel German and David Saulnier, say: "Whereas such kind of homes are usually built of wood, sheetrock and bricks, this is made from 612,000 recycled plastic bottles and is the first of its kind."



©JD Composites: ArmaPET Struct cored SIP.

Using SIP to build a house is not at all new to the construction industry, but instead of using expanded polystyrene (EPS), extruded polystyrene (XPS) or rigid polyurethane foam (PUR), here recycled polyethylene terephthalate foam (PET) was chosen for the core material. This prototype house is made of around 170 panels, all made of low density ArmaPET Struct with 4.4 lb/ft³ (70 kg/m³) and thicknesses of 1 to 6 inches (25 to 150 mm). Using the hand lay-up process ArmaPET Struct is covered with fiberglass/polyester resin skins. Aluminium siding is then applied on the outside and drywall on the inside.

Panels strong enough to withstand a hurricane

Although the ArmaPET Struct cored roof and wall panels are lightweight, they proved to be strong. An 8 x 8 foot wall panel (2.4 x 2.4 metres), weighing only 80 pounds (36 kg), withstood speeds of 326 mph (524 km/h) in a wind tunnel test chamber . **Twice as strong as a Category 5 hurricane!** David Saulnier, President JD Composites, says: "They basically couldn't destroy the panel, although the testing machine was at maximum power. They had never loaded a panel by hand in the test chamber that they couldn't break, ever. Ours was the first."

Assembled in less than a day

The build also came together very quickly. The entire 2,000-square-foot structure consists of around 170 panels, each designed for a different position. The panels were manufactured by three people in three weeks and the **assembly itself was completed within 14 hours!**

©JD Composites: Eco-friendly house consists of 170 ArmaPET Struct cored SIPs, assembled in 14 hours.

The ArmaPET Struct cored SIPs eliminate the need for framing, separate insulation, siding, shingles on the roof and nails, and they are 'simply' chemically bonded together.

In this combination of strength and limited installation time, JD Composites sees the ideal solution for housing in hurricane-prone regions and for disaster relief shelters. Joel German, Vice President JD Composites, explains: "Our idea isn't to make a few custom homes a year for couples looking to build their new dream home. Our goal is to pursue different avenues with this product, as there are a lot of possibilities and opportunities - emergency shelters, small, customization buildings like playhouse or hunting cabins, offices or dormitory buildings. International relief homes would take less than a week to build with a team of 10 workers."

A new housing concept to reduce energy costs

Along with a strong structure and quick and easy installation, there is a third unparalleled benefit of ArmaPET Struct cored SIPs, our foam provides better insulation than comparable materials. German confirms: "We are at a continuous R-30 level with no thermal bridging, achieving 2.3 times the efficiency of conventionally built homes which only achieve R-18 due to wood frame thermal breaks." This makes for great energy savings in the long term, which JD Composites estimates at 60,000 to 80,000 USD over a 25-year span.

Built for generations to come

ArmaPET Struct is a closed-cell material. Even if something punctures the skins of the wall or roof panels and humidity passes through the core, ArmaPET Struct maintains its functionality and shape. It is impermeable to water and moisture absorption and prevents degradation of the panels' structural and insulation properties, unlike conventional materials. In warmer and more humid climates, ArmaPET Struct is resistant to rot, mildew and termites. Additionally, it can bear heavier loads than a wood, steel or concrete structure, and thus easily supports thick ice and snow loads in winter. JD Composites states that their house is a truly "lock up and leave" home that requires no maintenance during unattended periods and has a life expectancy of over 250 years.

Tackling plastic pollution

With this new housing concept JD Composites, presents an innovative solution that will help control the overflow of landfills and reduce further environmental damage associated with the production of plastics. Saulnier emphasises: "This is a way to get rid of plastic waste and at the same time develop structures that are sustainable." And German adds: "With backgrounds in the seafood and boat building sectors, we've seen our ocean and beaches heavily polluted. Now, with this new process for building homes, we're not only offering an affordable and sustainable solution for creating green homes, we feel as though we're finally doing our small part to help clean up some of the mess."

// This innovative and eco-friendly new concept home complies with all building codes. In fact, it out-performs traditional construction in a number of categories: it is strong enough to withstand Category 5 hurricane winds, it has minimal maintenance requirements and its energy efficiency ratings put it in the upper levels of the energy guide. JD Composites says the building costs for their prototype home were similar to those for a conventional construction of the same size. Homeowners benefit from added value due to savings in whole-life costs.

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ABOUT ARMACELL

As the inventors of flexible foam for equipment insulation and a leading provider of engineered foams, Armacell develops innovative and safe thermal, acoustic and mechanical solutions that create sustainable value for its customers. Armacell's products significantly contribute to global energy efficiency making a difference around the world every day. With 3,135 employees and 24 production plants in 16 countries, the company operates two main businesses, Advanced Insulation and Engineered Foams. Armacell focuses on insulation materials for technical equipment, high-performance foams for high-tech and lightweight applications and next generation aerogel blanket technology.

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